



Potential distribution of dengue fever under scenarios of climate change and economic development

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Abstract:

Dengue fever is the most important viral vector-borne disease with similar to 50 million cases per year globally. Previous estimates of the potential effect of global climate change on the distribution of vector-borne disease have not incorporated the effect of socioeconomic factors, which may have biased the results. We describe an empirical model of the current geographic distribution of dengue, based on the independent effects of climate and gross domestic product per capita (GDPpc, a proxy for socioeconomic development). We use the model, along with scenario-based projections of future climate, economic development, and population, to estimate populations at risk of dengue in the year 2050. We find that both climate and GDPpc influence the distribution of dengue. If the global climate changes as projected but GDPpc remained constant, the population at risk of dengue is estimated to increase by about 0.28 billion in 2050. However, if both climate and GDPpc change as projected, we estimate a decrease of 0.12 billion in the population at risk of dengue in 2050. Empirically, the geographic distribution of dengue is strongly dependent on both climatic and socioeconomic variables. Under a scenario of constant GDPpc, global climate change results in a modest but important increase in the global population at risk of dengue. Under scenarios of high GDPpc, this adverse effect of climate change is counteracted by the beneficial effect of socioeconomic development.

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Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Special Report on Emissions Scenarios (SRES), Other Climate Scenario

Special Report on Emissions Scenarios (SRES) Scenario: SRES A1, SRES A2, SRES B1, SRES B2

Other Climate Scenario: A1B;BCM2;ECHO-G;EGMAM;Earth System Model

Exposure :

weather or climate related pathway by which climate change affects health

Precipitation, Temperature

Climate Change and Human Health Literature Portal

Geographic Feature: ☒

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☒

resource focuses on specific location

Global or Unspecified

Health Co-Benefit/Co-Harm (Adaption/Mitigation): ☒

specification of beneficial or harmful impacts to health resulting from efforts to reduce or cope with greenhouse gases

A focus of content

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: Dengue

Mitigation/Adaptation: ☒

mitigation or adaptation strategy is a focus of resource

Mitigation

Model/Methodology: ☒

type of model used or methodology development is a focus of resource

Outcome Change Prediction

Population of Concern: A focus of content

Resource Type: ☒

format or standard characteristic of resource

Research Article

Socioeconomic Scenario: SES scenarios

Timescale: ☒

time period studied

Medium-Term (10-50 years)

Vulnerability/Impact Assessment: ☒

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content